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SUBJECT OF INVESTIGATION

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(6) GENETIC ANALYSIS OF MICROORGANISM BY MIXED
INFECTION OF ACTIVE PHAGE PARTICLES
AND PHAGE OR BACTERIAL DNA,

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RESPONSIBLE INVESTIGATOR

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In the previous experiment, it could be known that *S. gallinarum* doubly infected with active phage ϕ_{10s} particles and purified DNA extracted from phage ϕ_1 could yield a few recombinant type phage between ϕ_{10s} and ϕ_1 besides a majority of normal ϕ_{10s} progeny phages.

In this case it must be mentioned that phage ϕ_{10s} is unrelated with ϕ_1 , the donor phage of DNA sample, so that there are no probability of occurrence of such recombinant type phage from the double infection of ϕ_{10s} and also active ϕ_1 phage particles, if any, survived in DNA sample.

On the other hand, among such newly obtained recombinant type phages there some particles endowed with the ability of lysogenic conversion of salmonella O(I) antigen which is one of genetic character of ϕ_1 , the donor phage of DNA, but not of phage ϕ_{10s} .

My chief research required in this Contract is the genetic and chemical analysis of the genetic factor concerning the lysogenic conversion of salmonella O(I) antigen by mixed infection method of active other phage particles and DNA sample extracted and purified from phage ϕ_1 .

Before setting forth research on this line, I believe, it will be more fruitful in future experiment to clarify much more genetic markers of ϕ_1 phage, the donor of DNA, and ϕ_{10s} phage or more precise relationship between both phages.

On this viewpoint, I have just started my research by the study on the analysis of another genetic character of phage ϕ_1 : the host controlled variation observed in this phage cultured through one of its sensitive host bacteria.

Here is summarized the results of experiments carried out during the past two months.

1) The phage ϕ_1 cultured by Sg, one of strain of *Salmonella gallinarum*-- ϕ_1 (Sg)--forms plaque on indicator Sg in good efficiency of plating, e.o.p., but can not form plaque in such a good e.o.p. on indicator S₄S, one of the delysogenized strain of *S. typhimurium* S₄.

The proportion of plaques on S₄S formed by ϕ_1 (Sg) to those of the same phage on Sg is about $10^{-5.505}$.

2) On the other hand, the phage ϕ_1 cultured by S₄S-- ϕ_1 (S₄S)--can forms plaque on S₄S almost in the same good efficiency as well as on Sg.

3) This restricted phage ϕ_1 (Sg), however, can also adsorb to indicator S₄S but in a little lower rate than that to Sg. Its K value, velocity constant of adsorption to indicator S₄S and Sg are 4.7×10^{-10} ml/min and 2×10^{-10} ml/min respectively.

4) Whether DNA of ϕ_1 (Sg) phage is or is not injected into S₄S cell will be a future problem. However, it seems to

occur also in this case since at least 5 minutes after adsorption of $a_1(Sg)$ onto S_4S the superinfection of $a_1(S_4S)$ is mutually excluded.

5) The analyses of the fate of DNA of $a_1(Sg)$ injected into S_4S will be carried on by several methods.

Of course the mixed infection of S_4S with DNA extracted from $a_1(Sg)$ and active phage particles of $a_1(S_4S)$ will be attempted.